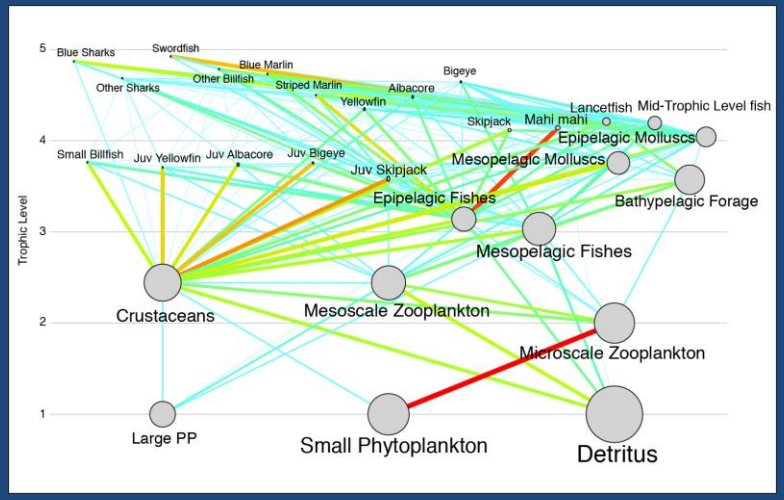
Incorporating ecosystem and environmental considerations into stock assessments



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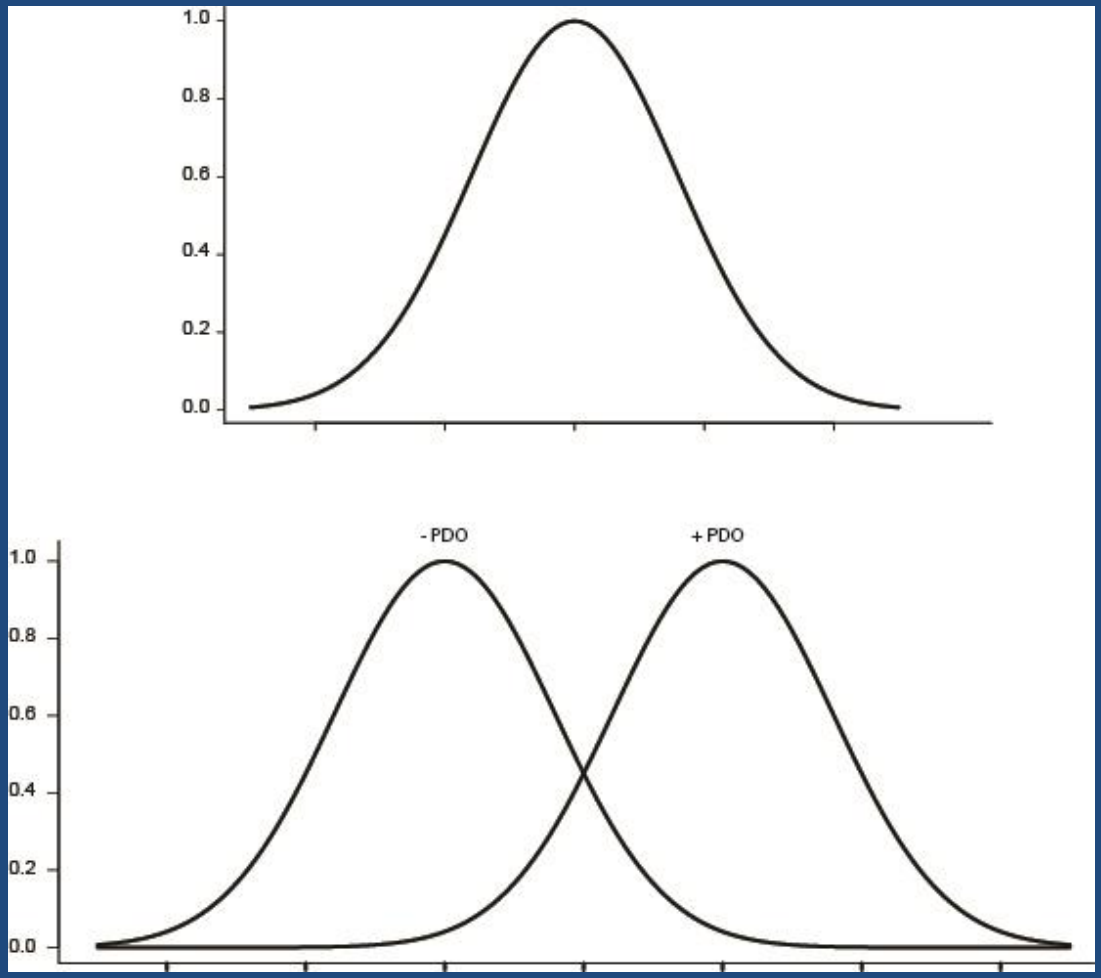
Honolulu, HI

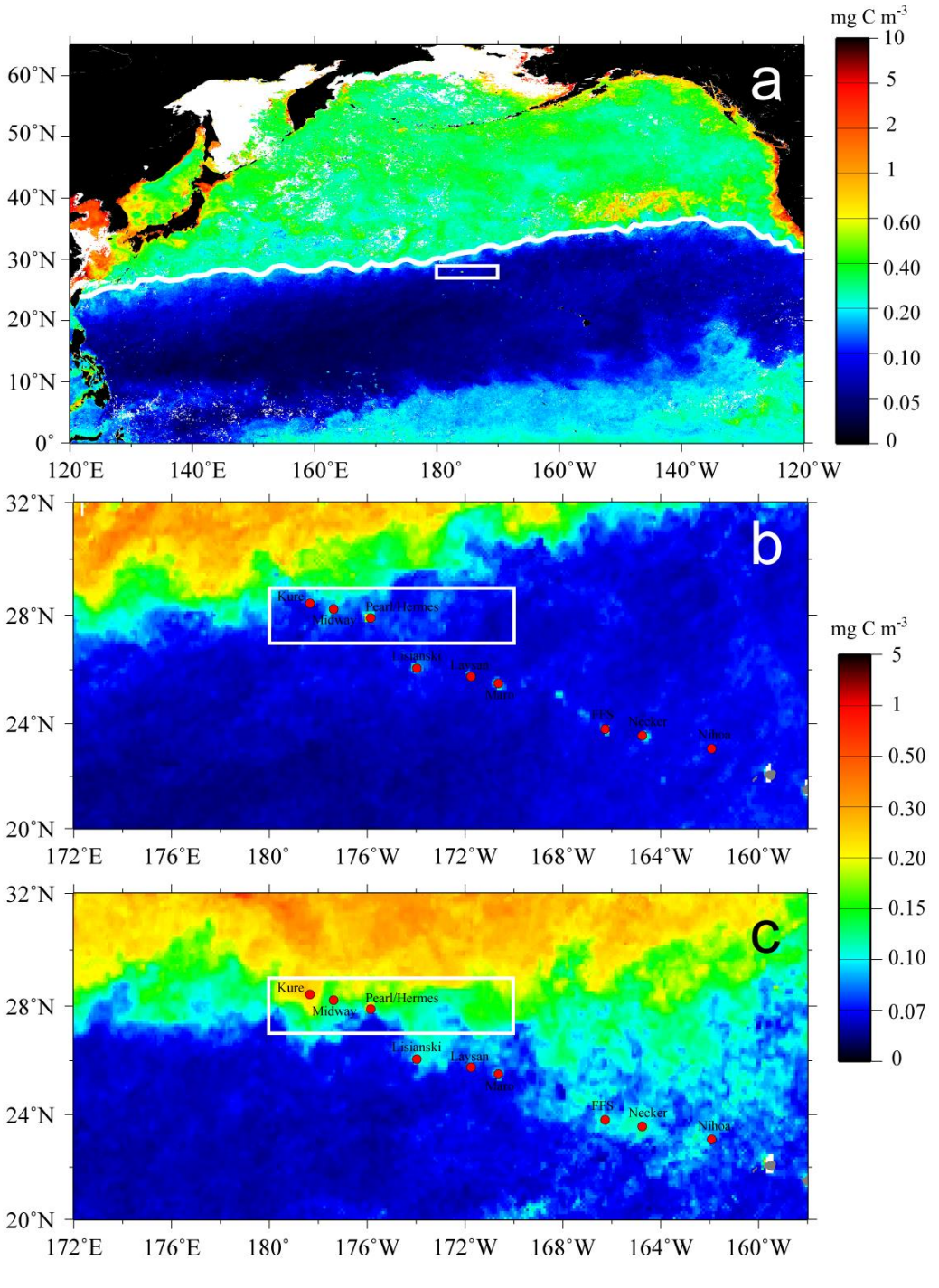
When might it be beneficial to incorporate environmental or ecosystem considerations into stock assessment?

Top: The frequency distribution of a population parameter with random environmental variation

Bottom: The same parameter when environmental variation results in 2 mean states



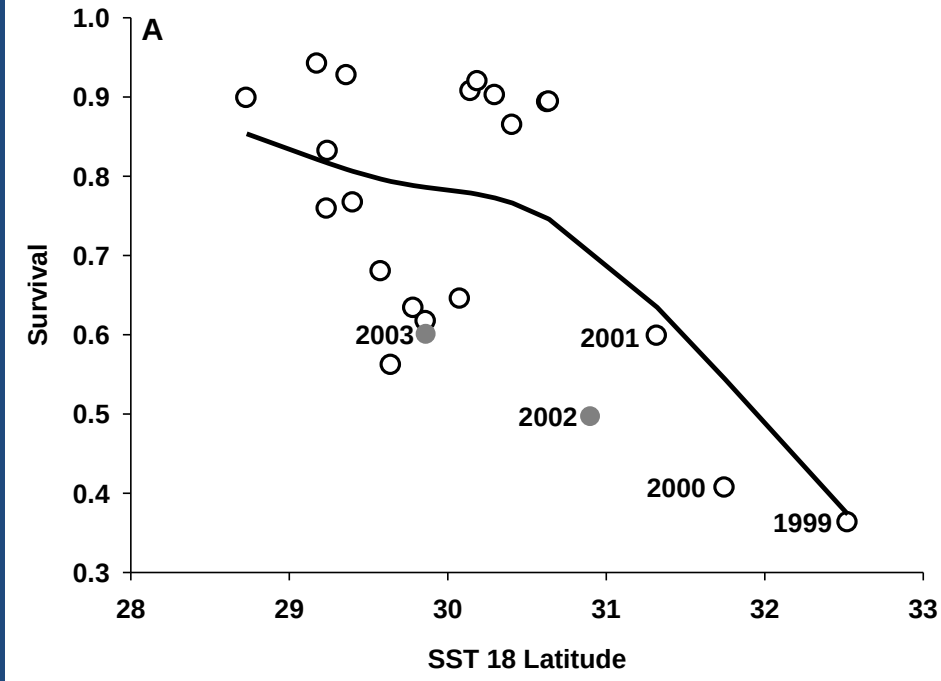
Satellite-derived winter surface chlorophyll in March 2000 (top, middle) and March 2004 (bottom) provide an example of interannual variation in northward extent oligotrophic waters (Polovina et al. 2001).

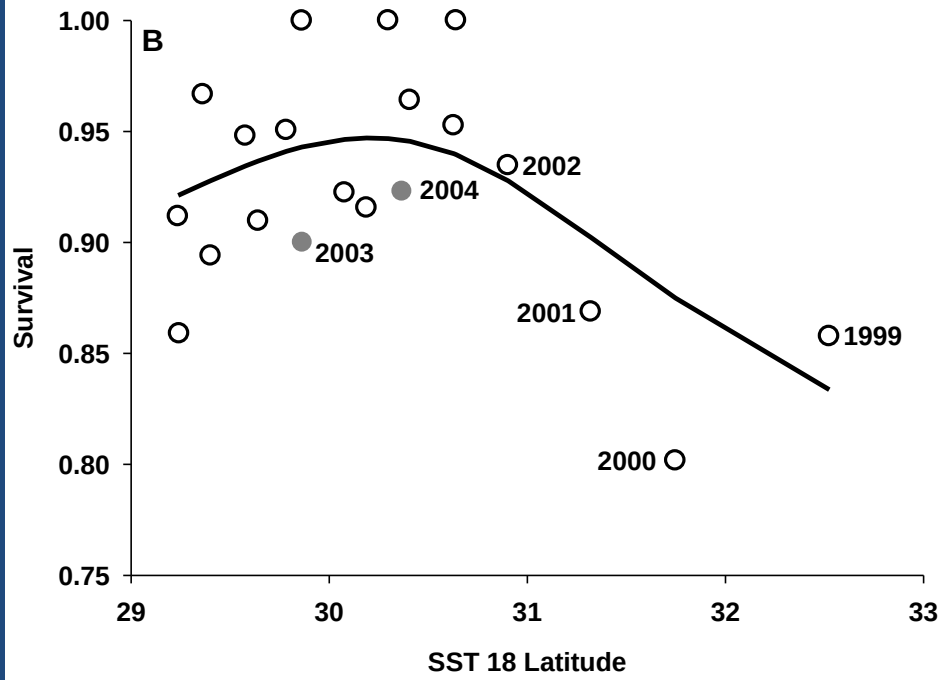


Survival of Hawaiian Monk Seals at northern atolls as a function of the position of the 18° SST isotherm, a proxy for the TZCF, 1985-2003 (Baker et al. 2007)

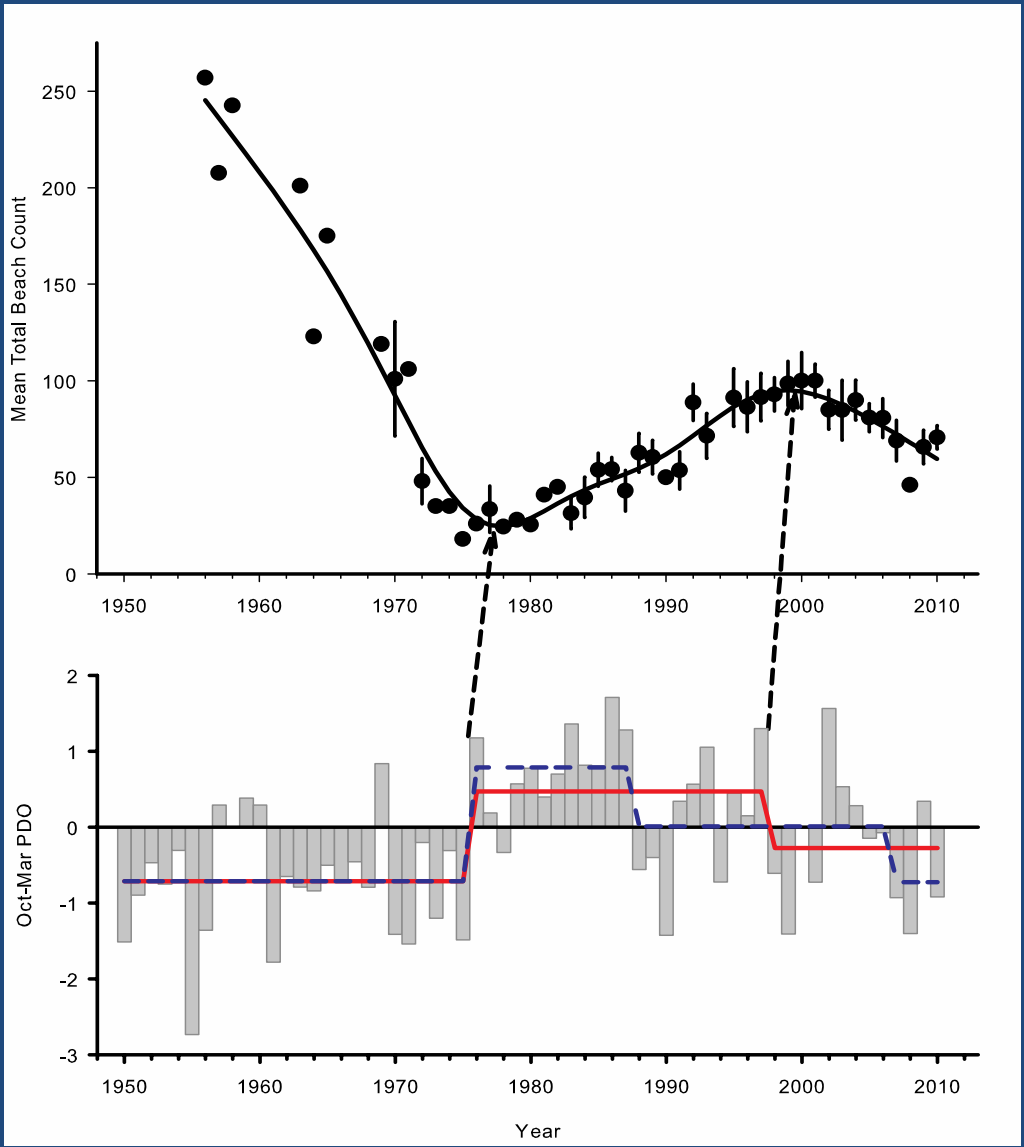
A: 1&2 yr old pups

B: 3&4 yr old pups





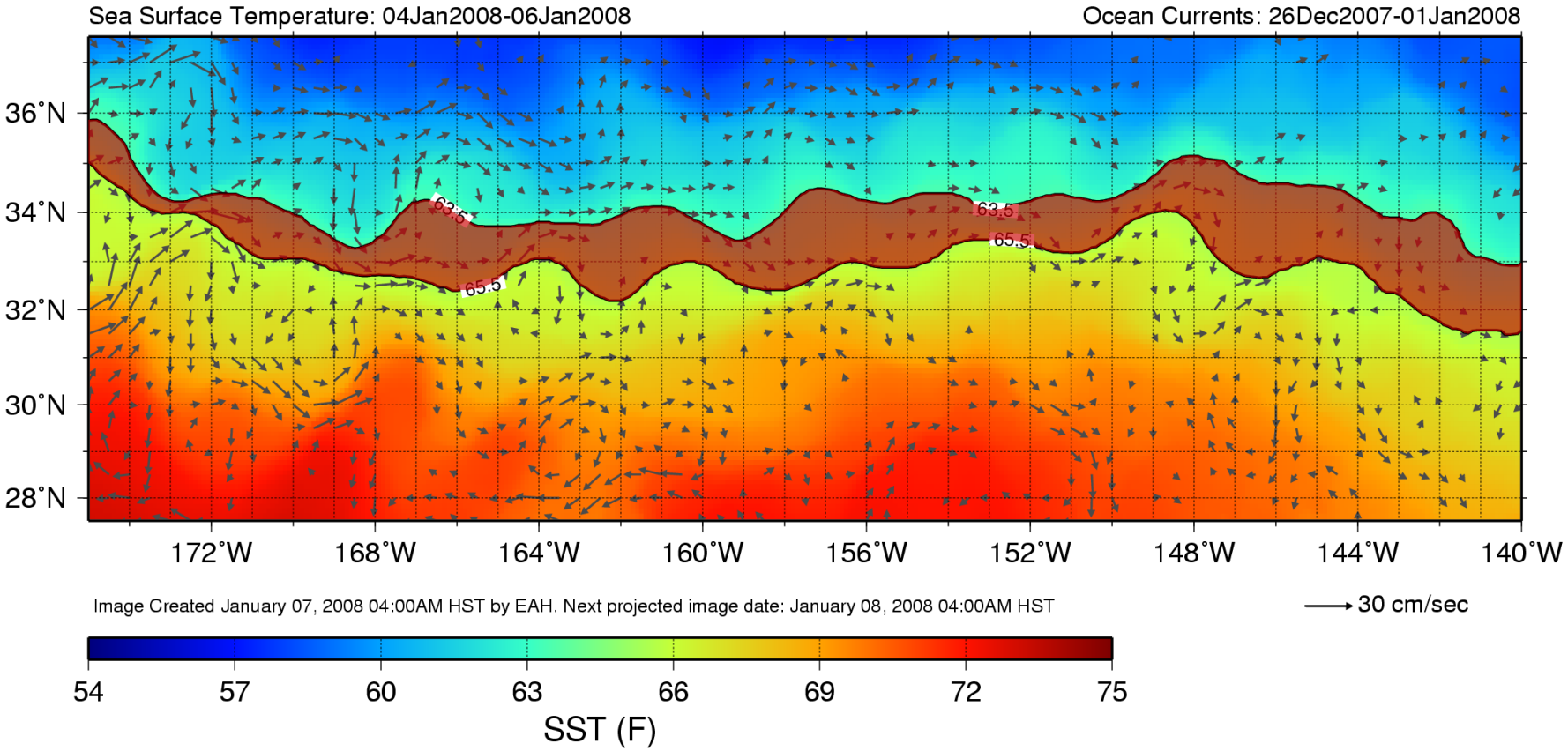
Pearl and Hermes monk seal beach count and PDO



J. Baker
pers.comm. 2014

EXPERIMENTAL PRODUCT

avoid fishing between solid black 63.5°F and 65.5°F lines
to reduce turtle interactions



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http://www.pifsc.noaa.gov/eod/turtlewatch.php
contact: turtlewatch@noaa.gov

Data provided by Central Pacific CoastWatch node

TURTLEWATCH

Ecosystem Considerations
2013

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Reviewed by:
The Plan Teams for the Groundfish Fisheries of the
Bering Sea, Aleutian Islands, and Gulf of Alaska

November 18, 2013
North Pacific Fishery Management Council
605 W. 4th Avenue, Suite 306
Anchorage, AK 99301

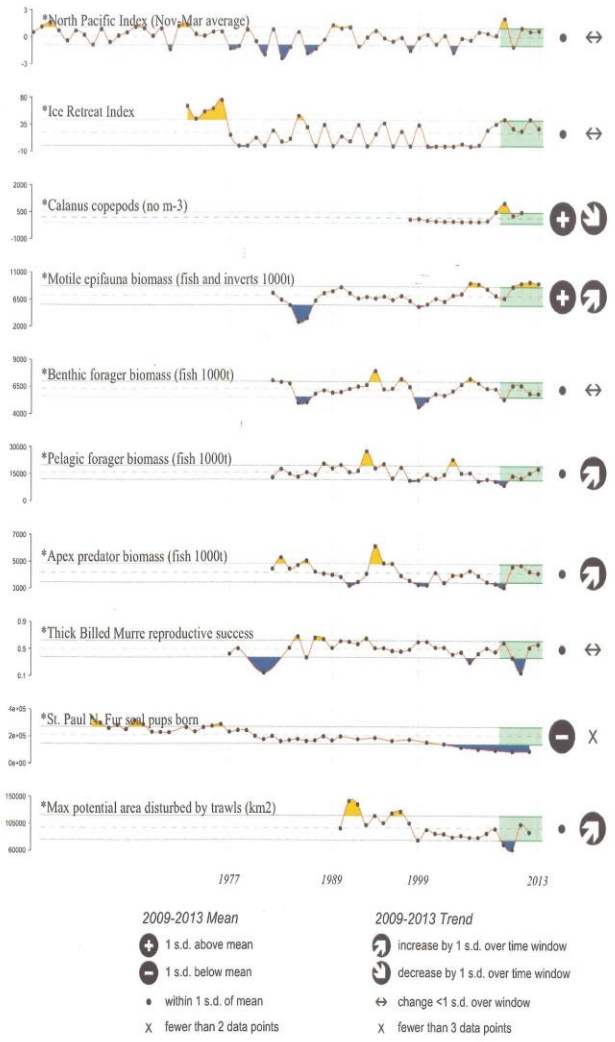
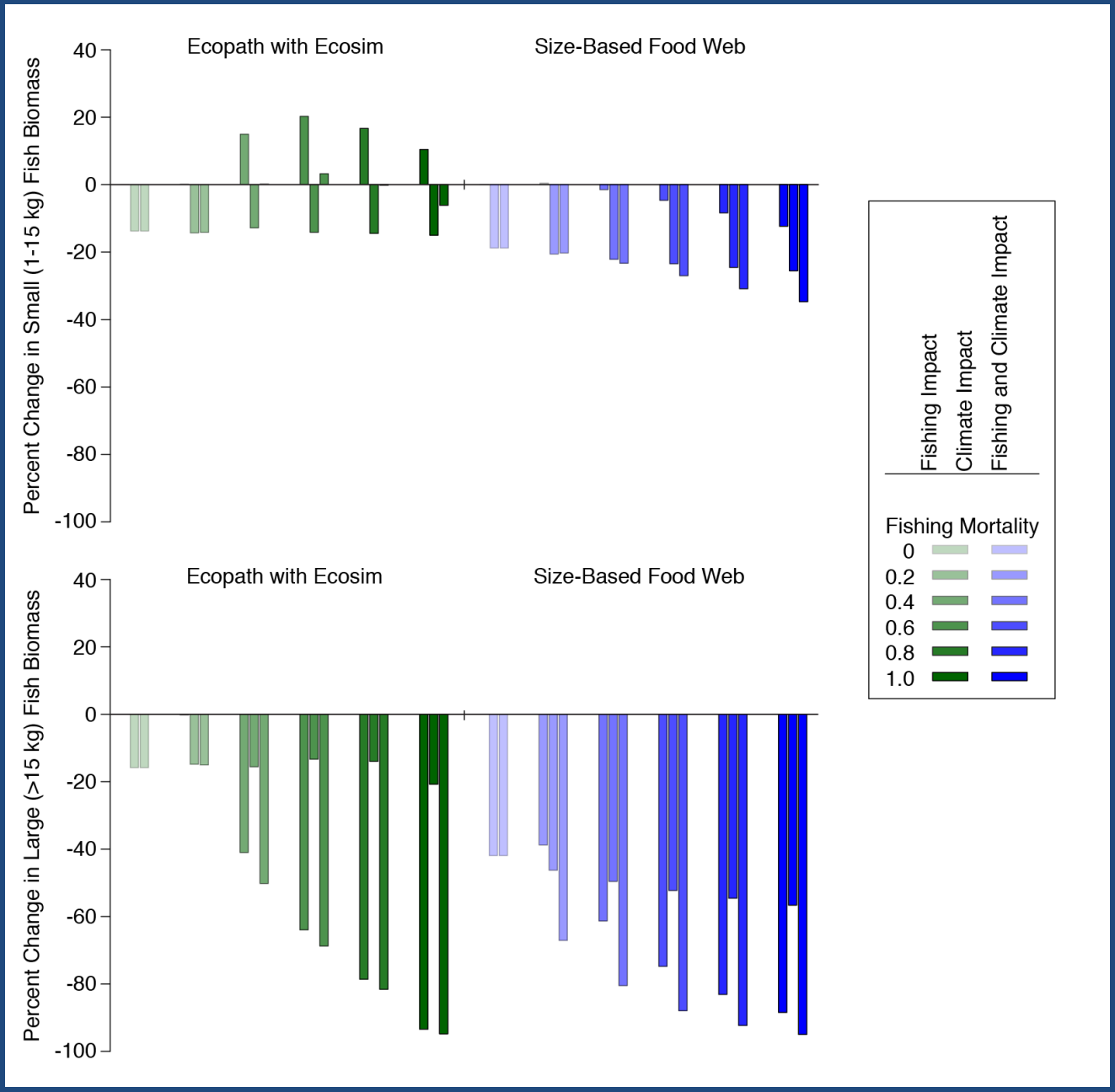


Figure 1: Eastern Bering Sea ecosystem assessment indicators; see text for descriptions. * indicates time series updated in 2013.

Center Ecosystem Models

- Ecopath with EcoSim – Hawaii Insular and pelagic models to explore fishing and climate impacts
- Size-based – Pelagic model to explore fishing and climate impacts
- Sepodym – Pacific swordfish and turtle model to explore fishing and turtle interactions
- Atlantis- Guam coral reef to explore fishing impacts

Impact of fishing and climate on large and small fishes biomass



Woodworth-Jefcoats et al. In. Review

Use ecosystem model output to compare with stock assessment model output. Example: Swordfish density from Sepodym (Abecassis Ph.D. thesis 2012)

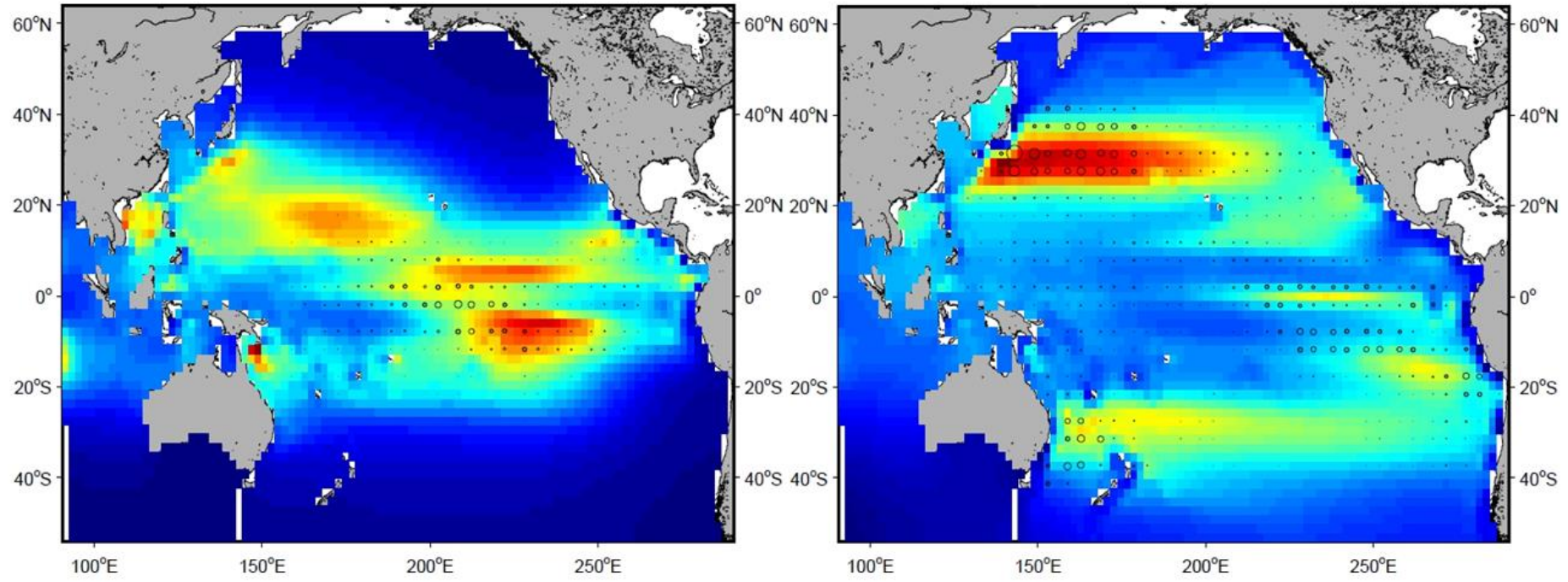
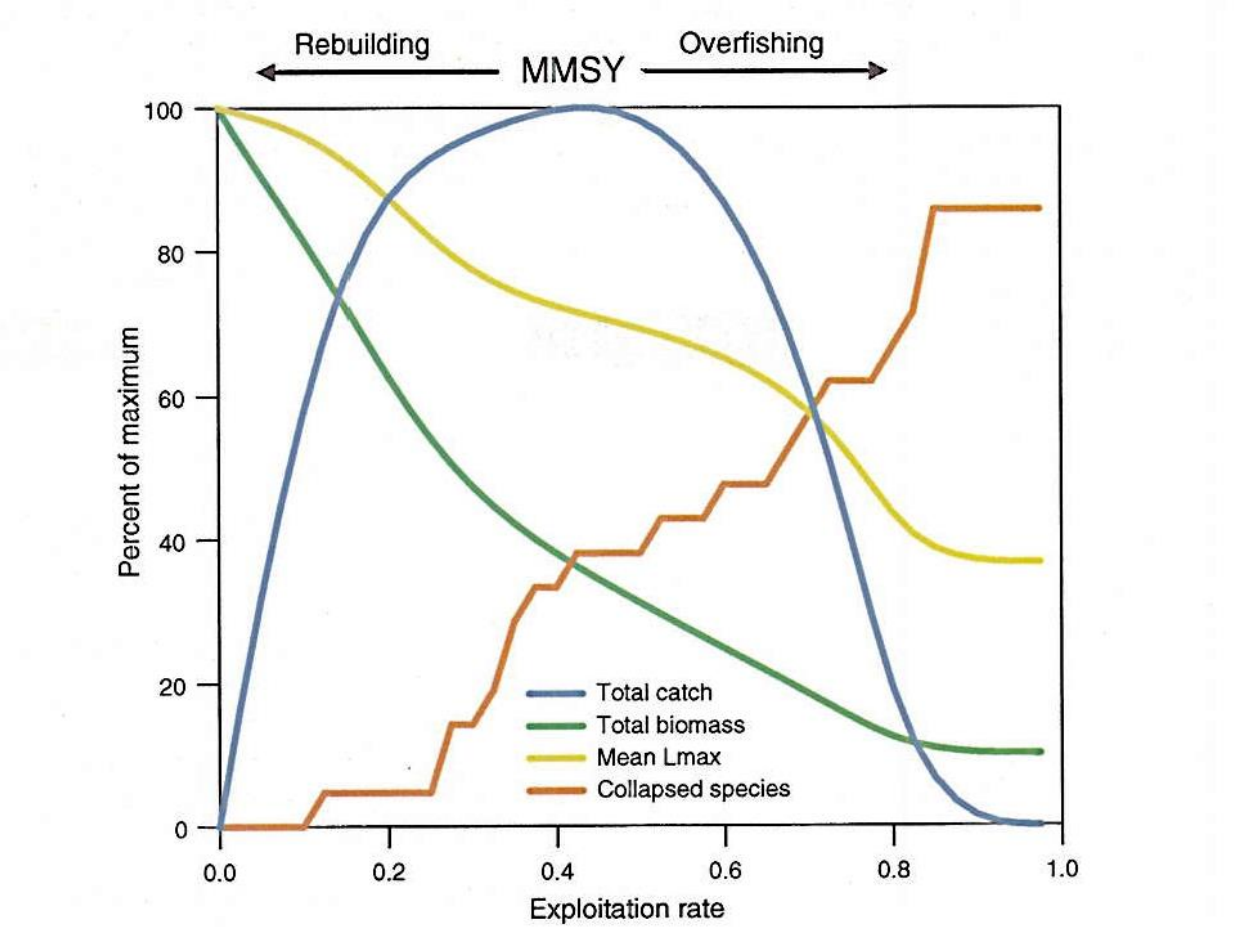


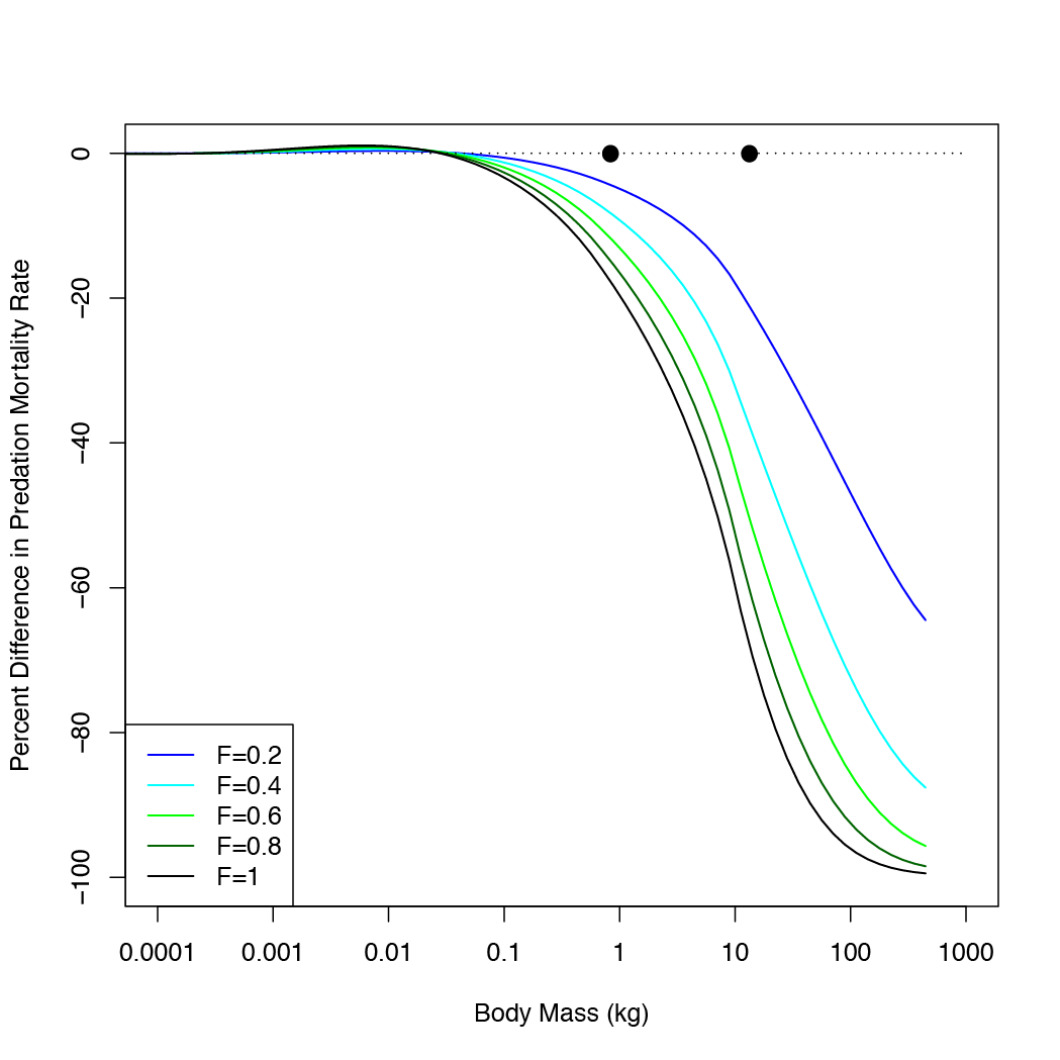
Figure 15. Mean distributions (in Nb/sq.km) of young (left) and adults (right) from 1992-2001 overlaid with Korean (L5) and Japanese (L4) CPUEs (circles), respectively.

Use ecosystem models to estimate system wide optimum yield (OY) as an ecosystem reference point?



Worm et al. 2011

Use ecosystem models to generate time series of parameters such as predation mortality to use in stock assessment models



Going Forward

1. Recognize appropriate opportunities to use ecosystem/environmental inputs to stock assessments

2. Support focused collaborations between ecosystem model and single species model folks

3. Continue to maintain and evaluate current ecosystem models and add new ones as needed

4. Two current projects: i) development of Ecosystem Status and Trends Report for the Kona IEA, ii) comparison of reference points and population size for Pacific swordfish from single species and Sepodym models